

# 2008-CE-1-17

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- 1) The product of matrices  $(PQ)^{-1}P$  is
  - a)  $P^{-1}$
  - b)  $Q^{-1}$
  - c)  $P^{-1}Q^{-1}P$
  - d)  $PQP^{-1}$
- 2) The general solution of  $\frac{d^2y}{dx^2} + y = 0$  is
  - a)  $y = P \cos x + Q \sin x$
  - b)  $y = P \cos x$
  - c)  $y = P \sin x$
  - d)  $y = P \sin^2 x$
- 3) A mild steel specimen is under uni-axial tensile stress. Young's modulus and yield stress for mild steel are  $2 \times 10^5$  MPa and 250 MPa respectively. The maximum amount of strain energy per unit volume that can be stored in this specimen without permanent set is
  - a) 156 Nmm/mm<sup>3</sup>
  - b) 15.6 Nmm/mm<sup>3</sup>
  - c) 1.56 Nmm/mm<sup>3</sup>
  - d) 0.156 Nmm/mm<sup>3</sup>
- 4) A reinforced concrete structure has to be constructed along a sea coast. The minimum grade of the concrete to be used as per IS: 456-2000 is
  - a) M 15
  - b) M 20
  - c) M 25
  - d) M 30
- 5) In the design of a reinforced concrete beam the requirement for bond is not getting satisfied. The economical option to satisfy the requirement for bond is by
  - a) bundling of bars
  - b) providing smaller diameter bars more in number
  - c) providing larger diameter bars more in number
  - d) providing same diameter bars more in number
- 6) The shape of the cross-section, which has the largest shape factor, is
  - a) rectangular
  - b) I- section
  - c) diamond
  - d) solid circular
- 7) Group symbols assigned to silty sand and clayey sand are respectively
  - a) SS and CS
  - b) SM and CS
  - c) SM and SC
  - d) MS and CS
- 8) When a retaining wall moves away from the backfill, the pressure exerted on the wall is termed as

- a) passive earth pressure
  - b) swelling pressure
  - c) pore pressure
  - d) active earth pressure
- 9) Compaction by vibratory roller is the best method of compaction in case of
- a) moist silty sand
  - b) well graded dry sand
  - c) clay of medium compressibility
  - d) silt of high compressibility
- 10) A person standing on the bank of a canal drops a stone on the water surface. He notices that the disturbance on the water surface is not traveling upstream. This is because the flow in the canal is
- a) sub-critical
  - b) super-critical
  - c) steady
  - d) uniform
- 11) A flood wave with a known inflow hydrograph is routed through a large reservoir. The outflow hydrograph will have
- a) attenuated peak with reduced time-base
  - b) attenuated peak with increased time-base
  - c) increased peak with increased time-base
  - d) increased peak with reduced time-base
- 12) A stable channel is to be designed for a discharge of  $Q \text{ m}^3/\text{s}$  with silt factor  $f$  as per Lacey's method. The mean flow velocity (m/s) in the channel is obtained by
- a)  $(Qf^2/140)^{1/6}$
  - b)  $(Qf/140)^{1/3}$
  - c)  $(Q^2f^2/140)^{1/6}$
  - d)  $0.48(Q/f)^{1/3}$
- 13) The base width of an elementary profile of a gravity dam of height  $H$  is  $b$ . The specific gravity of the material of the dam is  $G$  and uplift pressure coefficient is  $K$ . The correct relationship for no tension at the heel is given by
- a)  $\frac{b}{H} = \frac{1}{\sqrt{G-K}}$
  - b)  $\frac{b}{H} = \sqrt{G-K}$
  - c)  $\frac{b}{H} = \frac{1}{G-K}$
  - d)  $\frac{b}{H} = \frac{1}{K\sqrt{G-K}}$
- 14) Two primary air pollutants are
- a) sulphur oxide and ozone
  - b) nitrogen oxide and peroxyacetylnitrate
  - c) sulphur oxide and hydrocarbon
  - d) ozone and peroxyacetylnitrate
- 15) Two biodegradable components of municipal solid waste are
- a) plastics and wood
  - b) cardboard and glass
  - c) leather and tin cans
  - d) food wastes and garden trimmings
- 16) The specific gravity of paving bitumen as per IS: 73-1992 lies between
- a) 1.10 and 1.06

- b) 1.06 and 1.02
  - c) 1.02 and 0.97
  - d) 0.97 and 0.92
- 17) A combined value of flakiness and elongation index is to be determined for a sample of aggregates. The sequence in which the two tests are conducted is
- a) elongation index test followed by flakiness index test on the whole sample
  - b) flakiness index test followed by elongation index test on the whole sample
  - c) flakiness index test followed by elongation index test on non-flaky aggregates
  - d) elongation index test followed by flakiness index test on non-elongated aggregates